

Fermentation and Drying Effects on Physical Properties, Theaflavins, Caffeine, and Sensory Acceptability of *Psidium guajava* Drink

Nur Ain Elysa Sa'ad^a@Asri^a, So'bah Ahmad^{a*}

Structured Abstract

Background: Fermentation is a critical step in producing *Psidium guajava* drinks, impacting the quality of the final product. This study follows traditional black tea fermentation methods and examines how drying, which enhances sensory qualities and preserves the product, influences the outcome. However, it is important to note that, according to the Food Regulations 1985 (Regulation 260), only products made from *Camellia sinensis* leaves can be labeled as "tea". This research explores the effects of two fermentation periods (14 and 21 days) and two drying methods (oven and microwave) on the physical properties, theaflavin content, caffeine levels, and sensory characteristics of *Psidium guajava* drinks. The goal is to provide insights into optimizing fermentation and drying conditions to improve product quality and contribute to the field of product development.

Methods: *Psidium guajava* leaves, ranging in size from 7 to 15 cm in length and 3 to 5 cm in width, were harvested and stored in zip-lock polyethylene bags at 4°C for further analysis. The leaves were washed with tap water, then soaked in a water bath at 30°C for 5 minutes. After soaking, the leaves were spread on trays and withered in an incubator at 28°C for 16 hours. Following withering, the leaves were ground for 30 seconds. The resulting *Psidium guajava* powder was divided into different trays and fermented for either 14 or 21 days at temperatures of 25°C or 35°C. After fermentation, the powdered leaves were dried using two methods: oven drying at 110°C for 30 minutes and microwave drying at 900 watts for 2 minutes. The dried samples were stored in zip-lock polyethylene bags at room temperature. For analysis, 2 grams of each dried sample were mixed with 50 mL of distilled water, filtered through Whatman filter paper No. 40, and stored at 4-8°C. The physical properties of the *Psidium guajava* drink were determined, including moisture content, water activity, bulk density, tapped density, specific gravity, pH, color (Lab*), total ash content, and water extraction. Chemical analysis focused on the concentration and composition of theaflavins and caffeine. A sensory evaluation using a 9-point hedonic scale was conducted to assess the acceptability of the *Psidium guajava* drink, with the percentage of selection calculated to identify the best formulations among the samples.

Results: The study found that as fermentation time and temperature increased, most physical properties of *Psidium guajava* drink, including moisture content, water activity, tapped density, and pH, decreased, while bulk density increased. Specific gravity values increased, except for the samples fermented for 21 days under both drying methods. Lightness (L*) decreased with longer fermentation times and higher temperatures, except for the 21-day samples. Redness (a*), yellowness (b*), total ash content, and water extraction increased with longer fermentation times and higher temperatures. The highest concentration of theaflavins was found in the sample fermented at 35°C for 21 days with oven drying. Caffeine content was only detected in the same sample. Sensory evaluation revealed that the sample fermented at 35°C for 21 days under microwave drying had the highest overall acceptability, with 83.33% of participants preferring it based on colour, aroma, taste, and aftertaste.

Conclusion: In conclusion, fermentation conditions and drying methods significantly influence the physical properties, theaflavins, caffeine content, and sensory acceptability of *Psidium guajava* drink.

Keywords: *Psidium guajava*, Fermentation, Theaflavins, Caffeine, Sensory Acceptability

*Correspondence: sobah@uitm.edu.my

^a School of Industrial Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia